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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,238	06/25/2003	Naoya Hasegawa	9281/4579	4781

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P. O. Box 10395  
Chicago, IL 60610

EXAMINER
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BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/607,238

Applicant(s)

HASEGAWA ET AL.

Examiner

Kevin M. Bernatz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12, 24, 26-30 and 42-48 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 47 and 48 is/are allowed.
- 6) ☒ Claim(s) 1-12, 24, 26-30, 42, 44 and 45 is/are rejected.
- 7) ☒ Claim(s) 43 and 46 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Amendments to claims 1, 2, 5 – 11,, 24 and 26 - 29, cancellation of claims 13 – 16, 19 – 23, 25, 34, 35 and 39 - 41, and addition of new claims 43 - 48, filed on January 12, 2006, have been entered in the above-identified application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Claim Objections***

3. Claims 43 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Claim Rejections - 35 USC § 103***

4. Claims 1, 2, 7 – 12, 24, 26 – 30, 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiguchi et al. (U.S. Patent No. 6,495,275 B2) in view of Sugawara (U.S. Patent No. 6,828,039 B2), Sugawara (U.S. Patent App. No. 2004/052008 A1) and Fujiwara et al. (U.S. Patent App. No. 2002/0054461 A1) for the reasons of record as set forth in Paragraph No. 8 of the Office Action mailed on August 5, 2005.

Kamiguchi et al., Sugawara ('039 B2), Sugawara ('008 A1) and Fujiwara et al. ('461 A1) are relied upon as set forth in Paragraph No. 8 of the Office Action mailed on August 5, 2005.

Regarding the amended limitation in claims 1, 2 and 24, Kamiguchi et al. disclose that the plurality of free magnetic layers are soft magnetic layers (*col. 33, lines 36 – 48*) and that the K-layer (i.e. applicants' "current limiting layer") is located therebetween (see *Paragraph 12 of the Office Action mailed February 7, 2005 – Kamiguchi et al., col. 13, line 8 bridging col. 14, line 6: free layers of CoFe/K-layer/CoFe taught as exemplary free layer structures*).

Regarding the limitation directed to the opening ratio of the holes, the Examiner notes that the opening ratio is the relative surface area of holes versus non-holes and is directly correlated to the degree of conductivity between the layers. I.e. the higher the hole density/opening ratio, the more conductive material will be in contact with both films and, hence, the greater the conductivity between the layers.

Both Sugawara ('039 B2) and Fujiwara et al. teach the importance of optimizing the conductive area between two soft magnetic films in order to control the resistance between the films, and hence the overall magnetoresistance effect of the MR element (*Sugawara '039 B2, col. 1, line 40 bridging col. 2, line 7 and col. 5, line 46 bridging col. 6, line 44; and Fujiwara et al., Paragraphs 0004 – 0009, 0017 – 0019 and 0025*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the opening ratio (i.e. hole density/conductivity/resistivity) through routine experimentation,

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especially given the teaching in Sugawara ('039 B2) and Fujiwara et al. regarding the desire to optimize the resistance between soft magnetic films to insure good overall magnetoresistive properties, especially MR ratio. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d 1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Regarding claim 44, given that the Examiner maintains that the ferromagnetic film would fill the pin-holes and hence meet the limitation of the "conductive portion", the Examiner notes that Kamiguchi et al. disclose crystalline ferromagnetic films (*col. 33, lines 36 – 48*) and amorphous electron reflecting films (i.e. applicants' "insulating portion") (*col. 26, lines 43 – 44*) hence meeting the claimed limitations.

Regarding claim 45, Kamiguchi et al. disclose crystal grains and amorphous materials meeting applicants' claimed limitations (*as above and col. 26, lines 43 – 44*).

5. Claims 3, 4 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiguchi et al. in view of Sugawara ('039 B2), Sugawara ("008 A1) and Fujiwara et al. as applied above, and further in view of Mack et al. (U.S. Patent No. 6,462,919 B1) for the reasons of record as set forth in Paragraph No. 11 of the Office Action mailed on August 5, 2005.

The Examiner notes that the subject matter of claim 42 is taught for substantially the same reasons as indicated for claim 4.

6. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiguchi et al. in view of Sugawara ('039 B2), Sugawara ("008 A1) and Fujiwara et al. as applied above, and further in view of Kishi et al. (U.S. Patent App. No. 2002/0191451 A1) for the reasons of record as set forth in Paragraph No. 13 of the Office Action mailed on August 5, 2005.

### ***Allowable Subject Matter***

7. The following is a statement of reasons for the indication of allowable subject matter: regarding claim 43, the prior art of record fails to teach or render obvious controlling the thickness and size of the conductive particles and current limiting layer to meet applicants' claimed relative magnitudes. Regarding claims 46 – 48, while Kamiguchi et al. teach using at least three soft magnetic layers for the pinned magnetic layers (e.g. see *Figure 33*), the Examiner notes that Kamiguchi et al. fail to teach using such a structure as the free layer, especially since Kamiguchi et al. express concerns about unwanted scattering by the additional layer if it is located nearest the free magnetic layer (*col. 35, line 56 bridging col. 36, line 20*).

### ***Response to Arguments***

8. **The rejection of claims 1 – 12, 24, 26 – 30 and 42 - 48 under 35 U.S.C § 103(a) – Kamiguchi et al. in view of various references**

Applicant(s) arguments have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Applicants' amendment resulted in embodiments not previously considered (i.e. opening ratio of holes) which necessitated the new grounds of rejection, and hence the finality of this action.

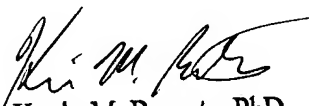
11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB  
March 14, 2006

  
Kevin M. Bernatz, PhD  
Primary Examiner